

National Immunization Program in Iran

Whys and why not

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The national immunization program of Iran has played an important role in achievements toward the control, elimination and eradication of some important infectious diseases. However, there are challenges regarding both diseases covered by the program and the type of vaccine or route of delivery, which are discussed in this Commentary. The current immunization program does not provide vaccines for rotavirus, *Hemophilus influenzae* type *b* (Hib), varicella, pneumococcal and influenza. There are also issues regarding use of oral poliovirus vaccine (OPV) instead of inactivated vaccine (IPV) and whole cell pertussis (wP) instead of acellular pertussis vaccine (aP). We have reviewed the evidence regarding these immunization issues; it seems that at least for rotavirus and Hib, there is sufficient evidence regarding the efficiency of vaccination in Iran. OPV is currently preferred because of the endemic situation of polio in Afghanistan and Pakistan (eastern neighbors) and considerations of efficiency. More data are needed for the analysis of policies on pneumococcal and influenza vaccines and aP vaccine.

Introduction

During recent decades, Iran has achieved successes toward the control, elimination or eradication of infectious diseases. Elimination of measles,^{1,2} congenital rubella syndrome¹ and neonatal tetanus,³ sustained polio-free status⁴ and control of diphtheria⁵ and hepatitis B⁶ are among them. The Expanded program

of immunization (EPI) has played an important role in these successes. EPI was launched in Iran in 1984 and developed during this period.^{7,8}

The current national immunization program in Iran has distinct differences from those of many other countries. In this paper, some of the challenges of the current national immunization program are discussed based on available evidence and the authors' opinions.

Current Program and Challenges

In 1982, the National Immunization Technical Advisory Group (NITAG) was established in Iran. NITAG consists of the under-secretary for health affairs (Ministry of Health), director of the center for communicable disease control, head of the immunization department, technical experts from different specialties and representatives of internal vaccine manufacturers (as ex-officio members with no voting right). NITAG plays the most important role for vaccine policy-making.⁷ The current program includes active universal immunization against 9 diseases: tuberculosis, poliomyelitis, diphtheria, tetanus, pertussis, hepatitis B, measles, mumps and rubella. Some other vaccines are provided to special groups at higher risk of disease (Table 1).

The challenges can be classified to two general groups. *List of diseases covered by the program.* Although a considerable burden of disease is attributable to rotavirus, Hib, pneumococcus, influenza and varicella, and vaccines are available with known profiles of efficacy/

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Table 1. Current national immunization program of Iran (Sep 2012)

Vaccine	Schedule
BCG	birth
OPV	birth; 2, 4, 6, 18 mo and 6 y
HepB	birth; 2 and 6 mo; specified high risk groups
DTwP	2, 4, 6, 18 mo and 6 y
MMR	12 and 18 mo
MenAC	Military personnel
Rubella	Women of child-bearing age with negative test for rubella
Td	Repeated every 10 y—for military and pregnant women
Varicella	Parts of country [high-risk groups]
Influenza	Specified high-risk groups

BCG, Bacille Calmette-Guerin; OPV, Oral Poliovirus Vaccine; HepB, Hepatitis B; DTwP, Diphtheria-Tetanus- Pertussis (whole cell); MMR, Measles-Mumps-Rubella; MenAC, Meningitis AC; Td, Adult Tetanus-Diphtheria.

effectiveness against these diseases, the current immunization program in Iran does not cover them. These vaccines are used routinely in many countries including some of the Eastern Mediterranean countries, and depriving people of these vaccines can expose them to preventable diseases.

For some of these vaccines, economic evaluations have been done and good profiles of cost-utility or cost-benefit have been demonstrated in the country. Hib is one such vaccine; Iran was considered a country with very low risk of Hib. In recent years, after correcting laboratory methods, data from sentinel sites showed a more realistic picture of disease epidemiology.^{9,10} It was concluded in an economic evaluation that a Hib vaccination program would be cost-effective in Iran's situation.¹¹ Although NITAG has approved Hib vaccination to be added to the EPI, it has not been started yet due to financial and administrative issues and partly due to the allocation of production responsibilities to internal vaccine manufacturers. As a result, unfortunately, a usable vaccine product is not accessible yet.

Another issue for the current program is the absence of rotavirus vaccine. Data from sentinel hospital-based surveillance showed that ~60% of all admissions of diarrhea are related to rotavirus.¹² An economic evaluation demonstrated the cost-effectiveness of vaccination against rotavirus for Iranian children.¹³ In this situation, integration of rotavirus into the EPI seems rational.

The World Health Organization (WHO) has recommended varicella vaccine for developing countries when they are able to achieve at least 95% coverage.¹⁴ Although no economic evaluation has been done yet for this vaccine in Iran, considering the usually mild course of disease and high costs of vaccination, it seems that this vaccine is not of priority in comparison to other vaccines. The vaccine is accessible through some parts of the private sector and is used sporadically by some families; considering the possibly short duration of immunity of this vaccine and theoretical probability of getting a more severe form of disease at older ages, this type of vaccination is not yet acceptable and thus not recommended.

Annual vaccination against influenza is used in many countries both for children and adults in higher-risk groups. The ministry of health and medical education in Iran provides vaccine just for some of the high risk groups such as health-care providers.¹⁵ The vaccine is also available through the private sector, however, there is no accurate estimate of vaccine coverage and pattern of distribution among different subgroups of population. Some studies are in process to assess the cost-effectiveness of influenza vaccine for the primary high risk groups; this might convince policy-makers to dedicate public funds for vaccinating more high-risk groups in future years.

WHO recommends pneumococcal vaccines for children worldwide, especially in countries with high under-age-5 mortality rates.¹⁶ The under-5 mortality rate in

Iran is around 25 per 1000 live births.¹⁷ There are very limited data regarding the epidemiology of pneumococcal diseases and serotypes of pneumococci. Studies on pneumococcal vaccine are also very limited. It seems that evidence regarding disease epidemiology in the country and cost analysis of vaccination are needed; this will help decision-making.

Vaccinations that target cancers have been recently considered in Iran, but there is not enough evidence regarding their cost-efficiency.

Type of vaccine or delivery. There are some challenges regarding the type of vaccines and their delivery in the EPI. Some of these are as follows:

Despite inactivated poliovirus vaccine (IPV) being used in most developed countries, Iran uses OPV. Iran has been certified as polio-free since 2001; however two of its neighbors (Afghanistan and Pakistan) are still endemic for polio. With respect to the commuting of people between these countries especially in zones around border areas, OPV continually has been preferred. In addition, substituting combined schedules (OPV+IPV) or IPV will not necessarily be cost-effective,^{18,19} so the current strategy will be continued during the pre-eradication era.

Another challenge for vaccine type is the use of whole cell pertussis vaccine (wP) instead of Acellular vaccine (aP) in combination with diphtheria and tetanus. The last dose of pertussis vaccine in Iran is provided to 6-y-old children (Table 1). Since, in countries with high vaccine coverage such as Iran, exposure to *Bordetella pertussis* is rare and immunity is decreased after 10 y of vaccination,^{20,21} an age shift of incidence to adults is expected. There are studies in process for substituting or adding aP vaccine to prevent such an age shift in incidence.

Different strategies have been studied in Iran for immunizing adults against hepatitis B²² that may lead to reducing the number of doses or adding booster doses.²³ Combining hepatitis vaccine to DTP also might have some benefits.

Conclusion

It seems that there is enough evidence for policy-makers to integrate vaccines for

Hib and rotavirus and even pneumococcal and influenza into the immunization program. Iran is supposed to reduce out-of-pocket payments based on the country's 5th developmental plan; an allocation of resources to cost-effective vaccines would be one of the most efficient investments. Although NITAG has successfully managed immunization policies during recent decades, it should mobilize technical academic partners for creating and pooling evidence and providing alternative decision choices at the appropriate times.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

References

- Esteghamati A, Gouya MM, Zahraei SM, Dadras MN, Rashidi A, Mahoney F. Progress in measles and rubella elimination in Iran. *Pediatr Infect Dis J* 2007; 26:1137-41; PMID:18043452; <http://dx.doi.org/10.1097/INF.0b013e3181462090>.
- Zahraei SM, Gouya MM, Azad TM, Soltanshahi R, Sabouri A, Naouri B, et al. Successful control and impending elimination of measles in the Islamic Republic of Iran. *J Infect Dis* 2011; 204(Suppl 1):S305-11; PMID:21666178; <http://dx.doi.org/10.1093/infdis/jir076>.
- Zarei S, Jeddi-Tehrani M, Akhondi MM, Zeraati H, Pourheidari F, Ostadkarampour M, et al. Primary immunization with a triple diphtheria-tetanus-whole cell pertussis vaccine in Iranian infants: an analysis of antibody response. *Iran J Allergy Asthma Immunol* 2009; 8:85-93; PMID:19671937.
- Moussavi T, Sadrizadeh B, Zahraei M, Nategh R, Nadim A. Polio eradication in Iran. *Arch Iran Med* 2012; 15:107-9; PMID:22292583.
- Azizi MH, Bahadori M, Raees-Jalali GA. A historical profile of diphtheria in Iran during the 19th and 20th centuries. *Arch Iran Med* 2012; 15:181-6; PMID:22369311.
- Alavian SM, Fallahian F, Lankarani KB. The changing epidemiology of viral hepatitis B in Iran. *J Gastrointest Liver Dis* 2007; 16:403-6; PMID:18193122.
- Zahraei SM, Marandi A, Sadrizadeh B, Gouya MM, Rezaei P, Vazirian P, et al. Role of National Immunization Technical Advisory Group on improvement of immunization programmes in the Islamic Republic of Iran. *Vaccine* 2010; 28(Suppl 1):A35-8; PMID:20412994; <http://dx.doi.org/10.1016/j.vaccine.2010.02.030>.
- Esteghamati A, Keshtkar AA, Nadjafi L, Gouya MM, Salaramoli M, Roshandel G, et al. Hepatitis B vaccination coverage among Iranian children aged 15-26 months in 2006. *East Mediterr Health J* 2011; 17:93-100; PMID:21735942.
- Shakerian S, Moradi-Lakeh M, Esteghamati A. Vaccine Efficacy against *Haemophilus influenzae* type b in under 5 children: A Systematic Review and meta-analysis. *J Isfahan Med School* 2010; 28:437-8.
- Jahromi AS, Rahmani K. Natural immunity to *Haemophilus influenzae* type b in children, south of Iran: need for vaccination. *Pak J Biol Sci* 2012; 15:160-3; PMID:22866548; <http://dx.doi.org/10.3923/pjbs.2012.160.163>.
- Moradi-Lakeh M, Shakerian S, Esteghamati A. Immunization against *Haemophilus influenzae* type B in Iran; cost-utility and cost-benefit analyses. *Int J Prev Med* 2012; 3:332-40; PMID:22708030.
- Esteghamati A, Gouya M, Keshtkar A, Najafi L, Zali MR, Sanaei M, et al. Sentinel hospital-based surveillance of rotavirus diarrhea in Iran. *J Infect Dis* 2009; 200(Suppl 1):S244-7; PMID:19821714; <http://dx.doi.org/10.1086/605050>.
- Shakerian S, Moradi-Lakeh M, Zahraei M, Shokraneh F, Esteghamati A. Cost-utility analysis of vaccination against Rotavirus in Iranian children. National Institute of Health Research 2012; Unpublished.
- World Health Organization. Varicella vaccines. WHO position paper. *Wkly Epidemiol Rec* 1998; 73:241-8; PMID:9715106.
- Khazaiepour Z, Ranjbarovin N, Hoseini N. Influenza immunization rates, knowledge, attitudes and practices of health care workers in Iran. *J Infect Dev Ctries* 2010; 4:636-44; PMID:21045356; <http://dx.doi.org/10.3855/jidc.1152>.
- World Health Organization. Pneumococcal vaccines, WHO position paper – 2012. *Wkly Epidemiol Rec* 2012; 87:129-44.
- Motlagh ME, Safari R, Karami M, Khosravi A. Life Expectancy at Birth in Rural Areas Based on Corrected Data of the Iranian Vital Horoscope. *Iran J Public Health* 2012; 41:18-24.
- World Health Organization. Polio vaccines and polio immunization in the pre-eradication era: WHO position paper. *Wkly Epidemiol Rec* 2010; 85:213-28; PMID:20545051.
- Griffiths UK, Botham L, Schoub BD. The cost-effectiveness of alternative polio immunization policies in South Africa. *Vaccine* 2006; 24:5670-8; PMID:16766096; <http://dx.doi.org/10.1016/j.vaccine.2006.05.032>.
- Izadi M, Afsharpaiman S, Jonaidi Jafari N, Ranjbar R, Gooya MM, Robat Sarpooshi J, et al. Immunization status of Iranian military recruits against *Bordetella pertussis* infection (whooping cough). *J Infect Dev Ctries* 2011; 5:224-6; PMID:21444992.
- Ghanaie RM, Karimi A, Sadeghi H, Esteghamati A, Fallah F, Fahimzad A. Re-emerging of pertussis in Iranian school-age children. Presented in conference. Personal communication.
- Alavian SM, Fallahian F, Lankarani KB. Implementing strategies for hepatitis B vaccination. *Saudi J Kidney Dis Transpl* 2010; 21:10-22; PMID:20061687.
- Poorolajal J, Mahmoodi M, Majdzadeh R, Nasserimoghaddam S, Haghdoost A, Fotouhi A. Long-term protection provided by hepatitis B vaccine and need for booster dose: a meta-analysis. *Vaccine* 2010; 28:623-31; PMID:19887132; <http://dx.doi.org/10.1016/j.vaccine.2009.10.068>.